

# Sleeve for Structurally Supporting a Penetrator of a Kinetic Energy Projectile

## Abstract

A rod sleeve made of smart material sleeves and / or steel sleeves with smart material rings surrounds the rod of a kinetic energy projectile. The rod may be made of DU, tungsten, or other material. Smart materials are materials such as nickel-titanium (nitinol) and copper aluminum nickel (CAN) that can be trained to change to one or more particular shapes at predetermined temperatures. The change in shape occurs on a molecular level, almost instantaneously. The rod sleeve can be made all or in part from smart material. The smart material is trained to shrink at cold temperatures and expand at hot temperatures. The sleeve may then be heated and expanded to allow the sleeve to be pressed on the rod. As the sleeve cools, it compresses and provides required support to rod during gun launch of the kinetic energy projectile. The sleeve heats up while traveling down range due to the aero-ballistic heating of the sleeve material. At this higher temperature, the sleeve expands. Upon projectile impact with the target, the sleeve minimally penetrates the target, allowing the rod to slip supported

through the sleeve and penetrate the target. The sleeve supports the rod as it penetrates the target but does not inhibit its penetration, remaining behind as the rod continues to penetrate the target.